LOCK ON N°21

AIRCRAFT PHOTO FILE

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Mikoyan MiG 21 MF FISHBED

Zoltán BUZA
edited by Willy PEETERS

VP
the world in scale

MiG-21 MF

1."Puma" Század
"Szentgyörgyi Dezsó" Harcászati Repülőezred
Magyar Légieó

VP
the world in scale

Cover: Scorching in the hot summer sun in a spartan revetment, a routine workday begins for this MiG-21 of the 1st "Puma" squadron based at Kecskemét. Exposure to the elements has turned some areas on fuselage and wings a bit paler.

Title Page: A MiG-21MF moments before touchdown after a 1200 km ferry flight from a Baltic missile range. The aircraft is somewhat "short-legged" because of the three 490 liter droptanks, its seven-league boots for such a trip.

Page 3 : An immaculate MiG-21MF of the 1st "Puma" squadron shortly after returning from the overhaul facilities. Indisputably, the "facelift" of the almost twenty years old lady had a favourable effect.

DEDICATION

This book is dedicated to the memory of those Hungarian fighter pilots who, in the final moments of their life, were struggling very desperately to regain control of their ill-fated MiG-21, only to find their efforts in vain.

ACKNOWLEDGMENTS

A lot of time and effort went into the creation of this Lock On, not in the least by Dr. Zoltán BUZA of Hungary who was able to open a lot of closed doors. Here his words of thank:
I would like to express my sincere gratitude to Lt.Gen. János Deák, Chief of the General Staff and Maj. Gen. János Urbán, Chief of the Hungarian Air Force for allowing me to visit the air base at Kecskemét.
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I am also deeply indepted to the personnel of the wing for their valuable assistance, especially to the following officers: Maj. János Horváth, RSM János Szél, Capt. István Kotroczó, Lt. Sándor Lengvári, Lt. Tibor Kapócs, Lt. Ferenc Matúz, 2nd Lt. László Blaskó, Capt. Olivér Völgyi, 2nd Lt. Gyula Vári, Capt. István Répás and 2nd Lt. János Sinkó.
Particular thanks are due to my friends Sándor Horváth and Capt. Zoltán Németh for organizing my visits and doing their utmost throughout. Without their help this monograph could not have been accomplished.
Dr Zoltán BUZA

Finally, VERLINDEN PUBLICATIONS and I would also like to thank all people involved, but especially Dr. Zoltán BUZA for again considering our company to share his valuable slides. Also a sincere word of thanks to Robert SENKOWSKI for submitting his photographic efforts.
Willy PEETERS

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Clearly state name and address when sending in your material.

INTRODUCTION

After its first delivery to operational units, some 35 years ago, the MiG-21 is still numerically the most important combat aircraft in the world. Approximately 7500 are in service in about 40 countries.

In 1953, Soviet operational requirements and new aircraft designs were dictated by Korean War experiences and the ever-growing US Strategic Bomber fleet. Those requirements called for a small daytime interceptor to engage the B-52's, the major component of the nuclear threat. Mach2 speeds and service ceiling close to 20000m were of paramount importance.

The prototypes were built in two aerodynamic configurations in almost parallel development projects. The conventional swept-wing E-2 version was rejected in favor of the delta-winged E-4, which made its maiden flight in 1956. Because of its cost-effectiveness, spartan design, reliability, ease of maintenance and operation, and last but not least the so-called "MiG diplomacy", the MiG21 has been the standard fighter of Warsaw Pact allies and other customers buying from the Soviets.

Three generations were in production from 1958 to 1986, with the MF being the most produced intermediate version of the third generation. Although it's currently considered obsolete, both eastern and western manufacturers offer the operators modernizing and updating programs to retrofit the aircraft with updated avionics, improved weapon systems and more powerful powerplants, so it's likely that thousands of MiG-21's will fly well into the next century.

The Ceskoslovenské Vojenské Letectvo (Czechoslovak Air Force) has operated all three generations of the MiG-21, including the unique R special reconnaissance version, the first of the third generation. They also manufactured the first generation MiG-21F under the designation S-107. The latest version in service is the MF. Instead of an overall camouflage scheme, Czech aircraft are overall metal with dark green dielectric panels (see page 35).

The CIS (ex Soviet) aircraft are subject of both withdrawal and various upgrade programs. OKB Mikoyan also offers foreign operators a refurbishing program to retrofit MiG-21's with modern digital avionics and the latest air-to-air missiles.

Having had expereince with the earlier generations of the MiG-21, the Magyar Légieró (Hungarian Air Force) received its MF's between 1971 and 1974. The Kecskemét based 59 Honi Vadászrepülo-ezred took over its aircraft from other fighter wings between 1976 and 1978. Later the wing adopted the name of Szentgyöryi Dezsó, the top scoring Hungarian fighter ace of WWII with 33 confirmed aerial victories. Both the 1."Puma" and 2."Dongó" (bumble-bee) Század (squadron) wear emblems of WWII fighter units.

During the seventeen years of service, flying approximately 30.000 hours, not even a single aircraft was lost due to mechanical failure, justifying its reliability and the high standard of maintenance within the Magyar Légieró or Hungarian Air Force.

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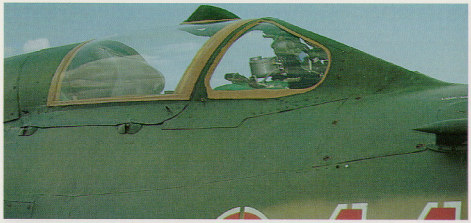
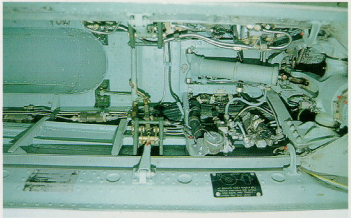
FOBIS

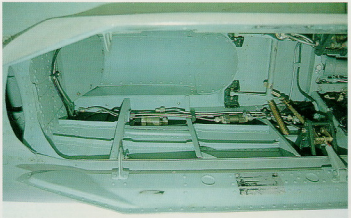


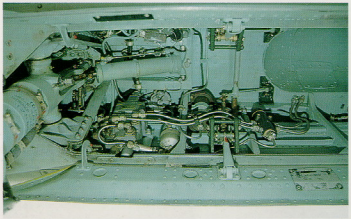
The center section of the armored glass windshield is 14,5mm thick. The clamshell canopy is hinged on the starboard side and features a foldable strut to hold it in the open position. The massive framing and the rear dorsal spine restrict the pilot's all-round visibility.

The heat resistant housing of the two 15-SCS-45 accumulator batteries. These batteries are installed before the first flight of the day and are only removed after the last mission of the day is completed, to be recharged overnight (except for aircraft on alert). These units, with 45Ah capacity, can supply the vital systems for a 15 minute period in case of a generator malfunction.

RSM János Szél installing the cover grid over the starboard suction relief door as part of the pre-flight activities. The grids protect against FOD (foreign objects) during engine runups. The accumulator batteries are yet to be installed as can be notified from the open battery bay aft of the nose landing gear.

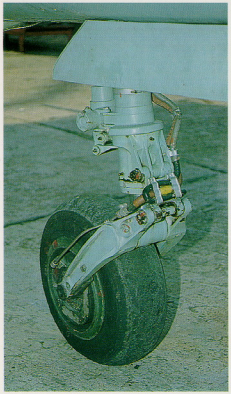


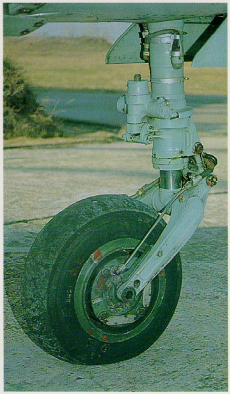


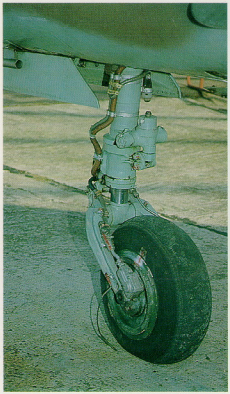


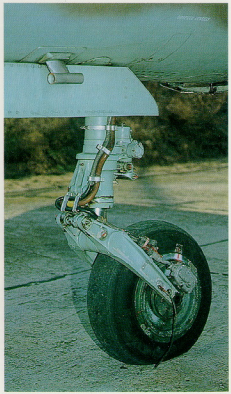
The steerable nose landing gear retracts hydraulically forward into the wheel well with the gear leg mechanically closing the doors. With hydraulics failing, it can be lowered mechanically or by pressurized air. Access panel to the radar diagnostic connector unit and nose cone actuating system is on the front wall.

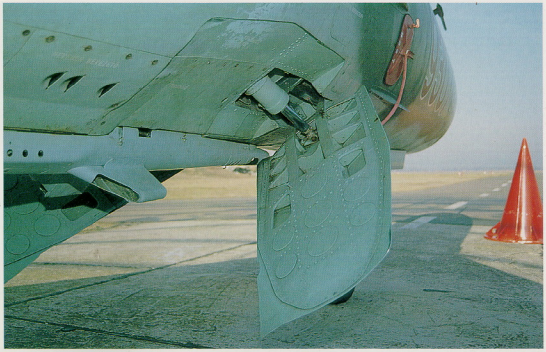
Anti-skid sensor and static discharger (which is inserted into the wheel axis prior to take-off and pulled to make ground contact immediately after landing by the mechanic) can be seen on the left side of the gear. The pressurized feed line to the multi disc brake can be seen on the right side of the 500 x 180mm KT-102 nose wheel. Next to the port side of the gear housing is the temperature probe of the radar system.

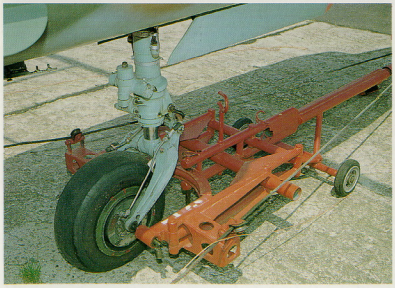




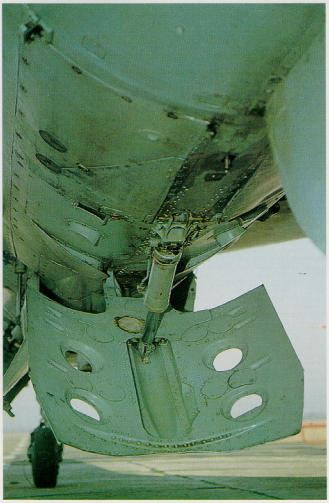








Detail of the steerable tow bar, also used for backing up the MiG 21 into its revetment.



The MiG21 has three airbrakes, two side-mounted into the bottom fuselage aft of the nose gear and a third one centrally-mounted in the belly aft of the main gear. Both forward airbrake housings have access panels to the nozzle adjusting unit (starboard) and throttle connecting rod (port), both located just aft of the hydraulic actuators. Maximum deflection of the forward brakes is 35° while the rear one covers a 40° arc (but blocked when belly tank is carried).

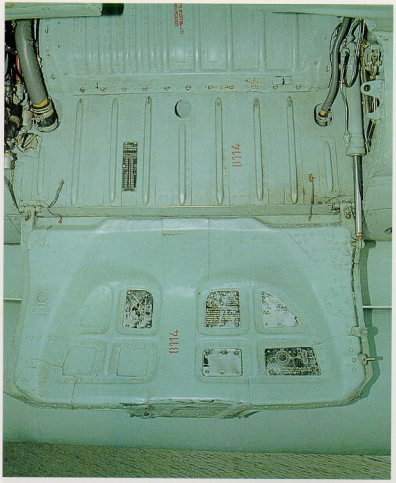
Pulling the T-handle on port side (photo top left) causes a short circuit which enables the airbrakes to be opened manually for inspection and access to the above-mentioned panels. Insufficient hydraulic power results in slightly drooped airbrakes on parked aircraft.

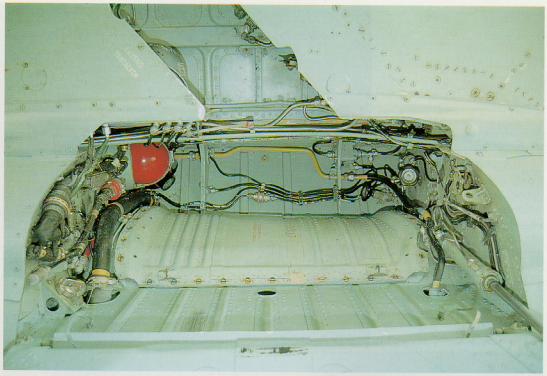
Two armament specialists of 2nd "Dongó" squadron, 2nd Lt Ferenc Bakó and MS Zsolt Kelemen, at the process of rearming the belly-mounted GSh-23 cannon. The PPL pyrotechnic charging and cocking cartridges have already been installed so the gun is moved back into horizontal position. The twin-barrel cannon uses the "Gast" principle in which the two breeches are interlinked mechanically by a horizontal rocking arm, using the recoil energy of one barrel to fire the next. This simple but reliable weapon weighs only 50,5 kilos and measures 1537mm in length. Muzzle velocity is 715 meters per second with a 3200 rounds per minute rate of fire. The centerline position of the gun minimizes negative effects of the recoil forces on the airframe and eliminates asymmetric loading of the gun.

Spent cases are ejected through the splayed chutes protruding from the gun fairing on both sides. The compact gun allows installment of either a 490 l or 800 l centerline dorptank.

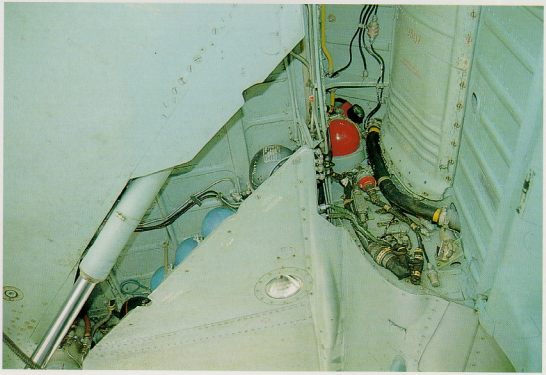
Red protective covers present on obsolete RS-2US (K-5) beam-riding missile, installed on APU-7D or APU-68 launchers and BDZ-60-21R pylons.

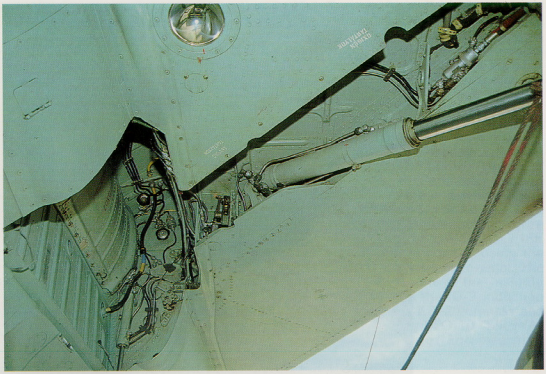
Standard air-to-air armament of the MiG-21MF consists of two RS-2US missiles on the inboard wing stations and two R-3s (K-13) infra-red homing missiles on the outer wing hardpoints. Although this configuration reduces ceiling altitude by 800m(2400 feet), the aircraft can still fly at a maximum speed of 2230 km/h.
The RS-2US, despite being a "fifties" weapon, has a devastating effect with its 13 kg blast-fragmentation warhead and a lethal radius of 150 meters. It weighs 83 kg and measures 2500mm with a 200mm diameter. It can be launched from 2500m to 5200 m at a 2500 m to 20500 m altitude, is then guided by a continiously tracked radar beam until impact. The solid rocket motor features two Laval type exhausts positioned at a 15° angle on the outer surface.

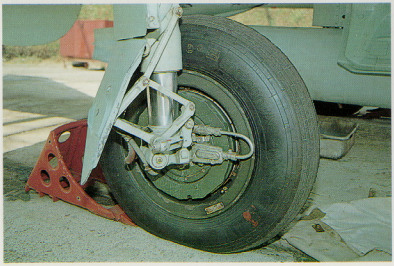




Starboard side main wheel detail. To the rear are mounted a red extinguishing foam tank, blue oxygen and black pressurized air tanks. Also visible is a yellow fuel pipe, partially taped in black.

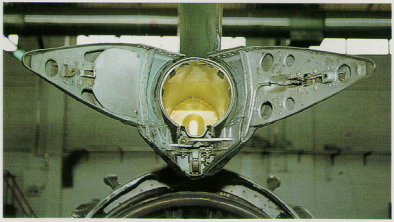






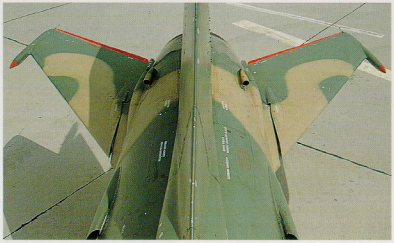
Hydraulically operated main wheel rotates 87° inwards to be stowed almost vertically into the fuselage wheel well. Pressurized air operates the gear in case of a hydraulic system fault. The struts have hydro-pneumatic shock absorbers with enough space to incorporate a 2,231 pressurized air tank. To keep the wheels nearly vertical, even when retracted, a complex mechanical linkage system (the "parallelogram") is installed at the bottom of the leg. Bulges on the main gear door and fuselage provide sufficiant space for the low pressure, 800 x 200mm KT-92B "rough terrain" tires. These 11 ply tires hold some 10 to 30 landings. Laterally mounted is an anti-skid sensor similar to the one of the nose gear leg.
Forward in the main well one can see filling valves and filler point of the pneumatical system as well as the attachment point of the hydraulic gear actuator. In the upper right corner of the photo above is the UP-53 electropneumatical valve of the anti-skid system.

A late winter sun glints off the characteristic contours of an inbound MiG21-MF heading for its revetment. No armament is carried and no belly fuel tank installed. The drag chute has already been jettisoned and will be retrieved by ground crew members. These 16m^2 drag chutes are later packed with an extraction chute on top and installed by members of the maintenance crew.



The MiG-21, because of its high landing speed, is equipped with a split drag chute cone in the bottom of the vertical tail, loaded with a PT-21UK brake chute which helps to shorten the landing roll and lessen the wear on brakes and tires. Chute deployment at 1m above ground level is possible, but it's never done to avoid overstress on the airframe.

Port and starboard side tail differences can only be found below the horizontal tailplane. At left can be seen the long narrow fairing starting just aft of the wing trailing edge, covering the nozzle hydraulic lines.
The starboard side features a generator cooling intake with MRP-56P radio beacon receiver panel below it, clearly shown on the centerfold photo. On top of the vertical tail are (from front to rear) a dielectric panel covering the aerial of the RSIU-5V (R-802) communications radio, three small rods for the SRZO-2 IFF system and a cone housing the SOD-57M transponder aerial. The small fairing aft of the insignia accomodates the ID-2 induction sensor of the KSI-2 compass and the protruding SPO-10 "SIRENA" radar homing and warning system.

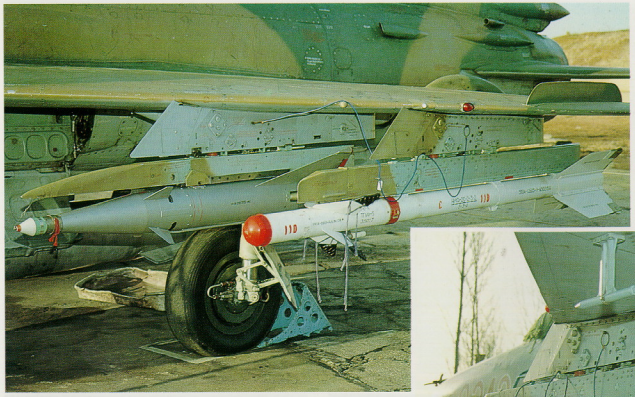


Two small cooling intakes on top serve the nozzle actuator while the larger ones forward cool air to the afterburner section. The forward part of the ventral fin is shared by the ARK-10 radio compass aerial and the LAZUR ground control intercept data link.
The mechanically actuated rudder has a 20° deflection to both sides. A BU-210B hydraulic booster rotates the all-moving, sway-braced stabilators (with anti-flutter counterweights at the tips) which deviation changes automatically according to speed and altitude by the ARU-3V unit. Maximum deflection is 7°30' up, 16°30' down in flight, 13° up and 28° down on the ground.
At left, lower fuselage detail such as engine hot air exhaust, SPRD rocket attachment point and release system, and engine compartment cooling disc valves is visible.

The SPS boundary layer system blows air over the flap upper surfaces, providing additional lift during landing. Flap setting for landing is 45° while a 25° setting is appropriate for take-off. The high pressure hot air bleed from the compressor is passed through the heat resistant ducting along the leading edge of the flaps. When the SPS is selected, the afterburner is blocked and the dry thrust decreases some 10kN.

This sun bleached MiG21 on display features alternative tail markings in that the star of the upper (and lower) wing surfaces is repeated on the vertical tail in lieu of the fin flash as carried today. Note the camouflage pattern of both aircraft is quite similar. Colors closely resemble the following FS colors: Light Green /FS34598, Dark Green /FS34092 and Light Brown / lighter shade of FS30219.

The smaller photo at close left clearly illustrates the inferior heat resistancy of these paints around the exhaust area.



The white R-3S (K-13) IR homing missiles are carried on APU-13M launchers attached to BDZ-60-21D pylons on the outboard stations. Its IR head and IR proximity fuse are protected with red plastic covers, and the impact fuses in the control fins with black caps. The fixed tail fins are equipped with rollerons (air driven gyro wheels). This missile is 2837mm long and has a diameter of exactly 127mm. Weight is 75,3kg with a 11,3kg blast fragmentation warhead, covering a lethal radius of 10-11 meters. It can be launched at an altitude up to 21000 m (65000 feet) and has a 9 km (6 miles) effective range.

Fully armed MiG21MF on stand-by with all protective covers, safety chord and pins in place. Wing leading edge antennas are: a small dielectric panel covering the SOD-57M transponder in front of the wing fence, the SRZO-2 (IFF) aerial next to the red navigation light and finally the SPO-10 SIRENA (RWR) aerial. The T-shaped aerial close to the wing tip belongs to the RVUM radio altimeter.

Below is a view at the retractable MPRF-1A light on port side. The pilot can select either power, 200W for landing or 130W for taxiing.